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distance of about 1 mm to 5 mm from the matrix based ion source.

REMARKS

Claim 48 has been canceled, claims 55 to 59 have been added, and therefore claims 1 to 47 and 49 to 59 are now under consideration.

Applicants respectfully requests reconsideration of the present application in view of this response.

With respect to paragraph forty-one (41) of the Office Action, Applicants thank the Examiner for indicating that claim 53 contains allowable subject matter. Since, however, claim 53 depends from claim 52, which is believed to be allowable as now presented, as explained below, any objection as to claim 53 is respectfully traversed. Regarding the submission of evidence that the performance of the mass spectroscopy system is enhanced solely by gas-to-gas contact, without coaxial heating, it is believed and respectfully submitted that this is evidenced by the fact that the arrangement of Figure 7 shows no enhancement -- even though heating of the capillary may occur, but not to the temperatures found useful by the system of the Danell reference.

With respect to paragraphs one (1) and eighteen (18) of the Office Action, the Abstract was objected to because of asserted "informalities which do not conform to the usual terminologies conventionally accepted in the pertinent art".

With regard to the "detector" vs. "mass spectrometer plus detector" terminology issues, it is respectfully submitted that persons having ordinary skill in the mass spectrometry art use the term "detector" to include the whole mass spectrometer system -- including a detector, and "detecting" is used to include mass analysis. One place this is found, for example, is on the Agilent web site cited in the Office Action. Clicking on "GC/MS" will bring up information on the 5973 MSD (Mass Selective Detector). Here, MSD is the name of the entire mass spectrometer system.

Also, in this regard, it is respectfully submitted that the objections are not supported, since the Office Action only asserts its subjective beliefs of what appropriate terminology in the subject matter of the present application encompasses. It is respectfully submitted, however, that it does appear from the whole Office Action that such objections are apparently based on an inapposite application of the case of *In re Hill*, 73 U.S.P.Q. 482 (C.C.P.A. 1947), which is cited (in paragraph eighteen at page ten) in an inapposite context. In that case, the applicant made no attempt to define a claim term, and so the accepted definition for the claim term was determined to be the definition as understood by those skilled in the art and for which there was specific evidence -- which did not rely on the subjective and unsupported assertions of the Office. *See In re Barr, Williams, and Whitmore*, 170 U.S.P.Q. 330 (C.C.P.A.1971).

More recently, the Federal Circuit has made plain the following:

> It is well-settled that, in interpreting an asserted claim, [one] should look first to the intrinsic evidence of record, i.e., the patent itself, including the claims, the specification and, if in evidence, the prosecution history. *Such intrinsic evidence is the most significant source of the legally operative meaning of disputed claim language.*
>
> First, we look to the words of the claims themselves, both asserted and nonasserted, to define the scope of the patented invention. *Although words in a claim are generally given their ordinary and customary meaning, a patentee may choose to be his own lexicographer and use terms in a manner other than their ordinary meaning, as long as the special definition of the term is clearly stated in the patent specification or file history.*
>
> . . . "It is a well-established axiom in patent law that a patentee is free to be his or her own lexicographer and thus may use terms in a manner contrary to or inconsistent with one or more of their ordinary meanings." Thus, second, it is always necessary to review the specification to determine whether the inventor has used any terms in a manner inconsistent with their ordinary meaning. The specification acts as a dictionary when it expressly defines terms used in the claims or when it defines terms by implication. As we have repeatedly stated, "[c]laims must be read in view of the specification, of which they are a part." The specification contains a written description of the invention which must be clear and complete enough to enable those of ordinary skill in the art to make and use it. Thus, the specification is always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term.

See Vitronics Corp. v. Conceptronic Inc., 39 U.S.P.Q.2d 1573, 1576-77 (Fed. Cir.1996) (emphasis added; citations omitted).

This is consistent with the position of the Patent Office. In this regard, Section 2173.05(b) of the M.P.E.P. specifically states that:

> While a term used in the claims may be given a special meaning in the description of the invention, generally no term may be given a meaning repugnant to the usual meaning of the term. *However, it has been stated that consistent with the well-established axiom in patent law that a patentee is free to be his or her own lexicographer, a patentee may use terms in a manner contrary to or inconsistent with one or more of their ordinary meanings.*

(M.P.E.P. § 2173.05(b) (citing *In re Hill*, 73 U.S.P.Q. 482 (C.C.P.A. 1947), and *Hormone Research Foundation Inc. v. Genentech Inc.*, 15 U.S.P.Q.2d 1039 (Fed. Cir. 1990)).

Still further, the Patent Office agrees that a "claim may not be rejected solely because of the type of language used to define the subject matter for which patent protection is sought", as with the written description of the specification. (*Cf.* M.P.E.P. § 2173.01 (citing *In re Swinehart*, 160 U.S.P.Q. 226 (C.C.P.A. 1971)). In short, an examiner's focus during examination for compliance with 35 U.S.C. § 112 is not whether more suitable language or modes of expression are available, and examiners should not reject language understood by person having ordinary skill in the art or insist on their own preferences. (*Cf.* M.P.E.P. § 2173.01).

Also, the law plainly supports that a reasonable interpretation of a term is based on the specification. (See *In re Weiss*, 26 U.S.P.Q.2d 1885, 1887 (Fed. Cir. 1993) (when interpreting a claim term or phrase, one must "look to the specification for the meaning ascribed to that term"; Board reversed) (unpublished decision); *In re Okuzawa*, 190 U.S.P.Q. 464, 466 (C.C.P.A. 1976) ("claims are not to be read in a vacuum, and limitations therein are to be interpreted in light of the specification in giving them their broadest *reasonable* interpretation"; Board reversed; emphasis in original) (citing *In re Royka*, 180 U.S.P.Q. 580, 582-83 (C.C.P.A. 1974) (claims are "not to be read in a vacuum and while it is true that they are to be given the broadest reasonable interpretation during prosecution, their terms still have to be given the meaning called for by the specification of which they form a part"; Board reversed; emphasis in original); and *In re Rohrbacher*, 128 U.S.P.Q. 117, 119 (C.C.P.A. 1960) (an "applicant is his own lexicographer and words used in his claims are to be interpreted in the sense in which they are used in the specification"; Board reversed)).

It is respectfully submitted that this is the case here since contrary to the foregoing law, the Office Action simply reflects its own interpretation of the terms objected to (as discussed more fully below) without regard to the sense in which those terms are defined and used in the specification.

Accordingly, in view of, for example, the explicit definitions provided at pages 4 to 7 of the present application (as well as the remainder of the definitions provided by the application as a whole, including the drawings), it is believed and respectfully submitted that the Office Action is attempting to *require* substitution of its own asserted and unsupported definitions for the explicit and implicit definitions of the present application -- which is simply not supported by the Federal Circuit or by the Patent Office itself.

As regards the specific objections, the Office Action asserts that the "word [sic] 'ion enhancement' is unusual for being technically non-descriptive", and then suggest the terminology of "ion source performance enhancement".

In this regard, page 5 of the specification specifically defines (in part) the following:

> The term "enhance" refers to any external physical stimulus such as heat, energy, light, or temperature change, etc. that makes a substance more easily characterized or identified. For example, a heated gas may be applied to "enhance" ions. The

> ions increase their kinetic energy, potentials or motions and are declustered or vaporized. Ions in this state are more easily detected by a mass analyzer. [W]hen the ions are "enhanced", the number of ions detected is enhanced since a higher number of analyte ions are sampled through a collecting capillary and carried to a mass analyzer or detector [of a mass spectrometry system].

(Specification, page 5). Thus, this specific definition, as well as the remainder of the specification, makes clear what is meant by the phrase "ion enhancement". That is all that the Patent Laws and the Federal Circuit require.

As further regards the specific objections to the Abstract, it is respectfully submitted that the Office Action asserts that "[i]n lines 2-3, the recited '(system) used to direct a heated gas toward ions produced by . . .' is misleading, because the heated gas remains fully separated from the ions all the time", and that "Correct [sic] would be '(system) used to direct a heated (hot) gas [to heat the] ions produced by . . . ." It is respectfully submitted that this statement and its relevance is not even understood, since, for example, and as understood, the heated gas is directed toward the ions, and the heated gas flows into the region between the target to be ionized and the collecting capillary. It may be agreed that the system is used to direct heated gas to heat the ions, but it is not understood how or why the Office Action insists on this language.

As further regards the specific objections to the Abstract, the Office Action asserts that "[i]n lines 5-6 [of the Abstract], regarding the recited 'increased number of ions more easily detected by a detector', the word 'easily' has no technical meaning", and also confusedly asserts that the "whole phrase is based on an incorrect omission of the important role of a mass spectrometer or analyzer prior to ion detection". It is respectfully submitted that these assertions are not understood. The Danell article reference, on which the Office Action relies for supposedly supporting other assertions, states on page 1, for example, that its "data indicates that the heat is declustering or desolvating the species *so that they are much more **easily** transmitted* into the vacuum system of the mass spectrometer", and further states at page 2 that heating the capillary "improves the detection limits".

As still further regards the specific objections to the Abstract, the Office Action suggests replacing the last two lines of the Abstract with "analyte ions from a matrix-based ion-source, enhancing the number or intensity of the analyte ions with an ion source performance enhancement system, analyzing the ions by a mass spectrometer, and detecting the analyzed ions with a detector".

As regards all of the foregoing objections, it is respectfully submitted that the above discussion of the law regarding a patentee's use of technical language makes plain that the objections are not supported under the law.

Nevertheless, to facilitate matters, the Abstract has been rewritten without prejudice, in view of the above discussion, and it is respectfully submitted that the Abstract as presented is

proper (as before). Approval is respectfully requested.

As regards paragraph two (2) of the Office Action, the paragraph beginning at line 12 of page 10 of the Specification has been corrected, as suggested. Approval is respectfully requested.

As regards paragraph three (3) of the Office Action, it is respectfully submitted that while the objections are not fully understood and may not be agreed with, to facilitate matters, the paragraph beginning at line 22 of page 10 and the paragraph beginning at line 15 of page 11 have been rewritten. Approval is respectfully requested.

As regards paragraphs two (2) and three (3) of the Office Action, it is noted that it is understood that Figure 7 should not have been labeled prior art, and therefore the reference in the paragraph beginning at line 15 of page 11 has been corrected to indicate that Figure 7 is an alternative device, and not prior art. Figure 7 has also been corrected to delete the reference to "Prior Art". Approval and entry is respectfully requested as to the specification correction, and as to the drawing correction, regarding Figure 7.

As regards paragraph four (4) of the Office Action, the objection is not understood. In this regard, Figure 1 of the present application shows a block diagram of a mass spectrometer 1, which includes an ion source 3, an ion enhancement system 2, an ion transport system 6 and a detector 11. (See Specification, pages 7 & 8; and Figure 1). As defined in the present application at page 5, the ion source includes the laser, the target substrate, and the target to be ionized on the target substrate. As explained in the specification and as explained above, the ion enhancement system "enhances" the ions by applying a heated gas to, as understood, increase the kinetic energies, potentials or motions so as to decluster or vaporize the analyte ions to enhance or increase the number of ions detected by the detector of the mass spectrometer. (See Specification, page 5, lines 13 to 27).

Accordingly, the ions are sent to the detector 11 of the mass spectrometer 1 via the transport system 6. It is respectfully submitted that this need not be explicitly stated in every line of the specification, since the application, including Figure 1, makes plain that the ions are ultimately sent to the detector 11 of the mass spectrometer 1. Page 7 of the specification specifically defines the detector in the mass spectrometer as being coupled to or including a mass analyzer. It is respectfully submitted that this disclosure is made plain in the present application to a person having ordinary skill in the art.

Still further, it is respectfully submitted that the Office Action's reference to the "5902 Magnum Electronic Multiplier" and the Agilent 1100 information is wholly misplaced. The first reference makes plain that a detector is a part of and for use in a mass spectrometer, which is wholly consistent with Figure 1 of the present application, as explained above. This is because a mass spectrometer requires a detector. As to page 2 of the Agilent 1100 information, it is respectfully submitted that any review of the reference makes plain that it shows a mass spectrometer system that includes an ion source, a capillary arrangement and a detector. Still further, a person having ordinary skill in the art would plainly acknowledge that

it may be stated properly that a mass spectrometer is a detector arrangement -- since a mass spectrometer includes a detector and since it detects ions.

Notwithstanding the foregoing and even though the objection may not be agreed with, to facilitate matters, the paragraph beginning at line 23 of page 11 has been rewritten. Approval is respectfully requested.

As regards paragraph five (5) of the Office Action, it inexplicably objects to the way that the Applicants' have characterized their own work with the subject matter of the present application. The Danell reference refers to heating the transfer capillary. In this regard, the present application refers to studies of heating the capillary, and refers to the drawback of this technique as being that heating and thermal conductivity of the system is limited by the materials used in the capillary. Accordingly, using the example embodiments referred to in the present application, it may indeed be surprising that the particular and specific results were achieved by applying the heated gas to the analyte ions directly, rather than by merely heating the capillary.

As understood, a drying gas or "curtain gas" is used in electrospray ion sources. (See U.S. Patent Nos. 4,531,056, 5,130,538, 5,306,412, and 5,432,343), where the purpose is to desolvate the charged droplets, resulting in ions of the analyte. Since the analyte is not in liquid solution in the present case, it is believed and respectfully submitted that one would not expect a heated gas to have any effect on the number of analyte ions obtainable, so that the enhancement effect was unexpected. There is no present explanation for why it works, but none is required. In the case of the arrangement of Figure 7 (which is erroneously labeled prior art in the Figure and in the specification, when it is understood that it is not), this is the arrangement used when Atmospheric Pressure MALDI was being developed. Earlier AP-MALDI sources were adapted from electrospray sources, and those included provisions for drying gas. It is believed that the drying gas served no purpose in these AP-MALDI configurations since it was not directed into the critical region, which is apparent from the arrangement of Figure 7. No "enhancement" was observed with the drying gas in such configurations. This is in contrast to the enhancement observed with using the heated gas as recited in the context of the presently claimed subject matter.

Notwithstanding the foregoing and even though the objection may not be agreed with, to facilitate matters, the paragraph beginning at line 23 of page 11 has been rewritten. Approval is respectfully requested.

As regards paragraph six (6) of the Office Action, to the extent that this represents an objection, it is believed that it was addressed above, with respect to the phrase "easily detected", which has been deleted from the Abstract, even though the objection is not agreed with for the reasons stated herein.

As regards paragraph seven (7) of the Office Action, the objection is not understood, nor is it understood how the specification is to be "modified to include this perspective". Therefore, the objection is respectfully traversed, absent further explanation by the Office.

As regards paragraph eight (8) of the Office Action, and regarding lines 11 and 12 of page 12, the Office Action objected to the use of the word "enhancing" as in "enhancing ion detection". As explained above, this phrase would be understood by a person having ordinary skill in the art. While the objection may not be agreed with, to facilitate matters, the text has been rewritten. Approval is respectfully requested.

As further regards paragraph eight (8), it is respectfully submitted that it is not understood why the Office Action also suggests that "desolvation" is being compared to the application of a gas. The statement is intended to indicate that "since no solvent is used with AP-MALDI and MALDI ion sources and mass spectrometers", desolvating, applying the gas to heat the ions, or both "would not be expected to be effective in enhancing ion detection" (that is, improving the intensity or number of the ions to be detected) in "matrix based ion sources and mass spectrometers". Accordingly, the objection is traversed.

As still further regards paragraph eight (8), the Office Action also states that the "word [sic] 'application of a gas' is misleading, because what really meant [sic] by Applicant [sic] is heating the ions". As explained above, this phraseology would be understood by a person having ordinary skill in the art, who would understand that applying the gas to the ions means applying the gas to heat the analyte ions. Notwithstanding the foregoing and even though the objection may not be agreed with, to facilitate matters, the paragraph has been rewritten. Approval is respectfully requested.

As regards paragraph nine (9) of the Office Action, it is respectfully submitted that the objection regarding the phrase "easily detectable" is not sustainable for the reasons explained above with respect to the objection to the Abstract. Also, as referred to above with respect to Figure 1 and its related Specification text at pages 7 and 8, the present application has not omitted the mass analyzer of the mass spectrometer 1, nor has it omitted the mass spectrometer 1. As explained, the mass spectrometer 1 includes the detector 11 -- which includes or is coupled to a mass analyzer, and a person having ordinary skill in the art would understand that a mass spectrometer may be referred to as a "detector arrangement", since it does include a detector and does detect ions by the specific detector system. The Office Action's repeated characterizations and assertions in this regard are simply not understood. Notwithstanding the foregoing and even though the objection may not be agreed with, to facilitate matters, the paragraph has been rewritten. Approval is respectfully requested.

As regards paragraph ten (10) of the Office Action, the objection regarding line 15 at page 12 concerning the statement "may also help with sample evaporation" is not really understood. While it may be believed that the heat may not be assisting in the evaporation of the sample from the sample holder, there may be some "desolvation" or breaking of clusters in the plume that is assisted by the heated gas. While the term "sample evaporation" should be acceptable, the sentence has been deleted without prejudice to facilitate matters. Thus, even though the objection may not be agreed with, to facilitate matters, the paragraph has been rewritten. Approval is respectfully requested.

With respect to paragraph twelve (12) of the Office Action, claims 11, 39 and 52 were rejected under the first paragraph of 35 U.S.C. § 112 as not being enabled.

It is respectfully submitted that the assertion that "A mass spectrometer or mass analyzer placed between the collecting capillary and the detector, which is critical or essential to the practice of the invention, but not [sic] included in the claim(s) is not enabled by the disclosure" is not consistent with the claims or the present specification. As explained above, Figure 1 makes plain that the mass spectrometer 1 includes a transport system 6 and a detector 11 -- which includes or is coupled to a mass analyzer. Claim 11 is directed to a "mass spectrometer" that comprises (or includes) certain structures, but it need not recite every structure, since the recitation of a "detector downstream from said collecting capillary . . ." is consistent with both the specification (including Figure 1) and its inclusion in a mass spectrometer system. It is also respectfully submitted that the Office Action's assertions regarding the Agilent 1100 and the 5902 Magnum Electronic Multiplier are simply not relevant, as explained above, including for the reason that they do not correctly interpret the information in those documents. As explained above, these references plainly show a detector as part of and included in a mass spectrometer system.

Notwithstanding the foregoing, and while the objections may not be agreed with for the above reasons, claim 11 as presented now provides that the detector includes or is coupled to a mass analyzer (as would be understood by a person having ordinary skill in the art). As explained above, Figure 1 and its related text shows the capillary and the detector 11 (which includes or is coupled to a mass analyzer) of the mass spectrometer 1.

Notwithstanding the foregoing, and while the objections may not be agreed with for the above reasons, claim 39 as presented now recites a mass analyzer, like claim 11.

Notwithstanding the foregoing, and while the objections may not be agreed with for the above reasons, claim 52 as presented now recites a mass analyzer, like claim 11.

As further regards the enablement rejections (as well as the remaining enablement rejections), it is respectfully submitted that the Office Action's assertions and arguments presented do not reflect the standard for determining whether a patent application complies with the enablement requirement that the specification describe how to make and use the invention -- which is defined by the claims. (See M.P.E.P. § 2164). The Supreme Court established the appropriate standard as being whether any experimentation for practicing the invention was undue or unreasonable. (See M.P.E.P. § 2164.01 (citing Mineral Separation v. Hyde, 242 U.S. 261, 270 (1916); In re Wands, 858 F.2d. 731, 737, 8 U.S.P.Q.2d 1400, 1404 (Fed Cir. 1988))). Thus, the enablement test is "whether one reasonably skilled in the art could make or use the invention from the disclosures in the patent coupled with information known in the art without undue experimentation." (See id. (citing United States v. Teletronics, Inc., 857 F.2d 778, 785, 8 U.S.P.Q.2d 1217, 1223 (Fed. Cir. 1988))). The Office Action "analysis" simply did not address the law on this issue.

As stated before, the Federal Circuit has made clear that there are many factors to be

considered in determining whether a specification satisfies the enablement requirement, and that these factors include but are not limited to the following: the breadth of the claims; the nature of the invention; the state of the prior art; the level of ordinary skill; the level of predictability in the art; the amount of direction provided by the inventor; the existence of working examples; and the quantity of experimentation needed to make or use the invention based on the disclosure. (See id. (citing In re Wands, 858 F.2d at 737, 8 U.S.P.Q.2d at 1404 and 1407)). In this regard, the Federal Circuit has also stated that it is "improper to conclude that a disclosure is not enabling based on an analysis of only one of the above factors," and that the examiner's analysis must therefore "consider all the evidence related to each of these factors" so that any nonenablement conclusion "must be based on the evidence as a whole." (See M.P.E.P. § 2164.01). It is also respectfully submitted that the Office Action has not addressed the law here.

Also not addressed by the Office Action is the fact that an examiner bears the initial burden of establishing why the "scope of protection provided by a claim is not adequately enabled by the disclosure." (See id. (citing In re Wright, 999 F.2d 1557, 1562, 27 U.S.P.Q.2d 1510, 1513 (Fed. Cir. 1993))). Accordingly, a specification that teaches the manner and process of making and using an invention in terms that correspond in scope to those used in describing and defining the claimed subject matter complies with the enablement requirement. (See id.).

In contrast to the above, however, it is respectfully submitted that the Office Action's arguments and assertions do not address -- as they must under the law -- whether the present application enables a person having ordinary skill in the art to practice the claimed subject matter of the claims without undue experimentation -- which it plainly does, as is further discussed herein. In short, the Office Action's arguments and assertions are conclusory and do not address the issue of whether one having ordinary skill would have to unduly experiment to practice the claimed subject matter of the rejected claims -- a proposition for which the Office bears the burden of proving a prima facie case as to the rejected claims. In fact, the Office Action did not even attempt to address in any way any of the rejected claims based on the undue experimentation standard.

In this regard, to properly establish enablement or non-enablement, the Office must make use of proper evidence, sound scientific reasoning and the established law. In the case of Ex Parte Reese, 40 U.S.P.Q.2d 1221 (Bd. Pat. App. & Int. 1996), a patent examiner rejected (under the first paragraph of section 112) application claims because they were based on an assertedly non-enabling disclosure, and was promptly reversed because the rejection was based only on the examiner's subjective belief that the specification was not enabling as to the claims. In particular, the examiner's subjective belief was simply not supported by any "evidence or sound scientific reasoning" and therefore ignored recent case law -- which makes plain that an examiner (and not an applicant) bears the burden of persuasion on an enablement rejection.

More particularly, the examiner in Ex parte Reese was reversed because the rejection had only been based on a conclusory statement that the specification did not contain a sufficiently explicit disclosure to enable a person to practice the claimed invention without exercising undue experimentation -- which the Board found to be merely a conclusory statement that only reflected the subjective and unsupported beliefs of a particular examiner and that was not supported by any proper evidence, facts or scientific reasoning. (See id.). Moreover, the Board made clear that it is "incumbent upon the Patent Office . . . to back up assertions of its own with acceptable evidence," and also made clear that "[where an] examiner's 'Response to Argument' is not supported by evidence, facts or sound scientific reasoning, [then an] examiner has not established a *prima facie* case of lack of enablement under 35 U.S.C. § 112, first paragraph." (See id. at 1222 & 1223; italics in original).

In the present case, the Office Action has not even asserted in a conclusory way that undue experimentation would be required.

It is therefore respectfully requested that the enablement rejections be withdrawn as to claims 11, 39 and 52.

With respect to paragraph thirteen (13) of the Office Action, claims 1, 11, 36 to 39, 41 to 45, 47, 49, 50, and 52 to 54 were rejected as indefinite under the second paragraph of 35 U.S.C. § 112.

It was asserted that the "word [sic] ion enhancement" is indefinite. It is respectfully submitted that these objections are traversed for the reasons explained at length herein with respect to the definition of ion enhancement, and that this phrase would be understood in view of the specification (including all of its definitions and its figures) by a person having ordinary skill in the art. It is therefore respectfully requested that these rejections be withdrawn.

With respect to paragraph fourteen (14) of the Office Action, claims 11, 38, 39, 47 and 52 were rejected as indefinite under the second paragraph of 35 U.S.C. § 112.

It was asserted that the "word [sic] ease of detection" is indefinite. It is respectfully submitted that these rejections are not sustainable for the reasons explained at length herein, and that this phrase would be understood in view of the specification (including all of its definitions and its figures) by a person having ordinary skill in the art. Notwithstanding the foregoing and even though the rejections may not be agreed with, to facilitate matters, this phrase has been deleted without prejudice from each of the claims. It is therefore respectfully requested that the indefiniteness rejections be withdrawn.

With respect to paragraph fifteen (15) of the Office Action, claims 11 and 47 were rejected as indefinite under the second paragraph of 35 U.S.C. § 112.

It was asserted that the mass spectrometer does not produce analyte ions, but merely analyzes their masses, and that it is the ion source that produces the ions. It is respectfully submitted that these rejections are not sustainable for the reasons explained at length herein, and that a person having ordinary skill in the art would understand that a mass spectrometer system includes an ion source that produces ions, and that the mass spectrometer may

therefore be referred to as producing ions. In particular, this would be understood in view of the specification (including all of its definitions and its figures) by a person having ordinary skill in the art. As to the misplaced reliance on the Agilent 1100, as explained above, it is respectfully submitted that it plainly shows (to a person having ordinary skill in the art) a mass spectrometer that includes an ion source, and that it therefore produces ions.

Notwithstanding the foregoing and even though the rejections may not be agreed with, to facilitate matters, this phrase has been deleted without prejudice from each of the claims. It is therefore respectfully requested that the indefiniteness rejections be withdrawn.

With respect to paragraph sixteen (16) of the Office Action, claims 1, 11 and 52 were rejected as indefinite under the second paragraph of 35 U.S.C. § 112.

It was asserted that the ions cannot be discharged into an ionization region. It is respectfully submitted that these rejections are not sustainable for the reasons explained at length herein, and that a person having ordinary skill in the art would understand, based on the specification, that the ionization region refers to the area between the ion source and the collecting capillary, and in particular refers to the analyte ions produced by the ion source that reside in that region and which have not yet been channeled into the collecting capillary. (Specification, page 5, line 28 to page 6, line 7). In particular, this would be understood in view of the specification (including all of its definitions and its figures) by a person having ordinary skill in the art. While many of the analyte ions may be formed in the "ionization region" -- that is, in the plume coming off the surface of the sample holder, the ionization process may include charge transfer from the (vaporized) matrix, so that the term is believed to be appropriate.

Notwithstanding the foregoing and even though the rejections may not be agreed with, to facilitate matters, this phrase "ionization region" has been changed without prejudice to ion region in the claims, even though it is believed that ionization region is definite. Additionally, the fourth sentence of the paragraph beginning at line 23 of page 11 has been rewritten without prejudice to refer to "the ion or ionization region 15." Approval is respectfully requested. It is therefore respectfully requested that the indefiniteness rejections be withdrawn.

With respect to paragraph seventeen (17) of the Office Action, claims 11, 39 and 52 were rejected as incomplete under the second paragraph of 35 U.S.C. § 112.

It was asserted that a mass spectrometer or mass analyzer needs to be placed between the collecting capillary and the detector. It is respectfully submitted that these rejections are not sustainable for the reasons explained at length herein, and that a person having ordinary skill in the art would understand, based on the specification, that the detector includes or is coupled to a mass analyzer -- all of which is included in a mass spectrometer. (Specification, page 7, lines 19 to 22). In particular, this would be understood in view of the specification (including all of its definitions and its figures) by a person having ordinary skill in the art. It is also respectfully submitted that it is inconsistent to state that a mass spectrometer may be

inserted between the collecting capillary and the detector when the mass spectrometer arrangement or system includes such parts, as disclosed in the Specification.

Notwithstanding the foregoing and even though the rejections may not be agreed with, to facilitate matters, these claims have been rewritten without prejudice to indicate that the detector of the mass spectrometer system includes or is coupled to a mass analyzer (even though it is believed that the claims were complete as written). It is therefore respectfully requested that these rejections be withdrawn.

With respect to paragraphs nineteen (19) to twenty-one (21) of the Office Action, claims 1, 11, 22, 26, 36 to 39 and 47 were rejected under 35 U.S.C. § 103(a) as unpatentable over the Danell reference in view of the Laiko I and Laiko II references, and in further view of U.S. Patent No. 5,022,379 to Wilson and U.S. Patent No. 4,098,589 to Buswell.

The Office Action effectively admits that the primary Danell reference does not disclose the use of an ion enhancement system (such as, for example, a conduit) that is arranged to enhance the analyte ions (such as, for example, heating them with gas) before they enter the collecting capillary so as to enhance detection (such as, for example, by increasing the intensity or number of analyte ions that is detected). In this regard, the system of the Danell reference uses a heating coil to heat the species that enters the capillary.

As indicated at lines 4 to 11 of page three of the present application, however, such studies have focused on heating the transfer capillary near the source, and such studies may show some limited improvement in overall instrument sensitivity. As stated, however, it is believed that a drawback of such an approach is that heating and thermal conductivity of the system is limited by the capillary materials. This is why the examples of the present application at pages 12 and 13 indicate sharp peaks (ion enhancement) at certain m/z ratios.

As regards the third level references, they do not suggest the use of enhancing the analyte ions by, for example, using a conduit to apply heated gas to the analyte ions in the analyte region 15. These references do not relate in any way to mass spectrometry or the problems of improving ion detection sensitivities, as with the presently claimed subject matter.

In particular, the third level Buswell reference purportedly concerns a catalytic reaction apparatus, such as for steam reforming a hydrocarbon feedstock to produce hydrogen, includes a tubular reactor disposed within a furnace. As stated, the reactor includes an annular reaction chamber which is heated along its outer wall by a countercurrent flow of furnace gases traveling through a narrow annulus external thereof, and the reaction chamber is also heated along its inner wall by regenerative heat from the reaction products which leave the annular chamber and flow countercurrent to the flow within the reaction chamber through a narrow annulus disposed along the inner wall thereof. As stated, this apparatus is capable of high reactor thermal efficiency over a wide range of heating rates, including very high heating rates, and is compact and is for use with a large number of closely packed tubular reactors disposed within a single furnace. (See Buswell, Abstract). This reference is directed to the wholly different problem of providing a catalytic reaction apparatus having the capability of

operating at high reactor thermal efficiencies. (See Buswell, Summary Of The Invention).

Also, in particular, the third level Wilson reference purportedly concerns a coaxial dual heat exchanger having at least two heat exchange surfaces and which has the combustion of the fuel (which generates the heat) take place within the heat exchanger rather than the heat of combustion being introduced into the exchanger from an external combustion chamber and in which the flame is directed into an opening of a truncated cone which cone has a shape approximating the shape of the flame and wherein the tips or ends of the flame "play" on an arcuate surface which is in thermal energy transfer communication with fluid to be heated which is at the unheated or ambient temperature. Additionally, as stated, the fluid, air in the case of a hot air system, is introduced into the passages where heat exchange will take place, and directed toward the hottest region of the combustion chamber, so that the coldest air comes into thermal contact with the hottest region providing for maximum heat exchange. As further stated, the flame is introduced into the combustion chamber in a direction that is essentially parallel to the axis of the cylindrical device, so that the flame does not impinge onto any substantially flat or planar surface. As stated, because of the construction of the nozzle etc., the flame forms into a cone configuration allowing thorough mixture with the combustion air and thus providing for complete and efficient combustion. As further stated, the structural details and the pressures that are developed within the combustion chamber and the combustion region, cause the flame to "play" along the conically configured walls of the truncated portion defining the combustion chamber and to impinge onto the curved/arcuate surface which conductively transfers heat to the air or fluid entering the first heat exchange volume or space. Also, as stated, the heat of the combustion gases is given up to the fluid in basically (5) heat exchange volumes of the device. (See Wilson, Abstract).

The third level Wilson reference is directed to the wholly different problem of providing a heat exchange device which would be capable of burning waste oil products efficiently and in a manner which would allow easy cleaning of the burner unit and the heat exchanger, a unit or device which has the combustion take place within the heat exchanger instead of in a chamber removed from the heat exchange region, and such a device in which the combustion flame does not impinge directly onto a surface causing deposits to form which may result in the incomplete and inefficient burning of the fuel. (See Wilson, Description of the Prior Art).

It is therefore respectfully submitted that a person having ordinary skill in the art simply would not be motivated in any way to consider combining either of the third level references with the primary Danell reference, and that the claimed subject matter would not result in any event. This is because the third level references are directed to solving entirely different problems in entirely different technology areas than the problems met by the presently claimed subject matter.

In this regard, to reject a claim as obvious under 35 U.S.C. § 103, the prior art must disclose or suggest each claim element and it must also suggest combining the elements in the

manner contemplated by the claim. (See Northern Telecom, Inc. v. Datapoint Corp., 908 F.2d 931, 934 (Fed. Cir. 1990), cert. denied, 111 S. Ct. 296 (1990); In re Bond, 910 F.2d 831, 834 (Fed. Cir. 1990)). Thus, the "problem confronted by the inventor must be considered in determining whether it would have been obvious to combine the references in order to solve the problem." (See Diversitech Corp. v. Century Steps, Inc., 850 F.2d 675, 679 (Fed. Cir. 1998)). It is respectfully submitted that, as discussed above, the references relied on, whether taken alone or combined, do not suggest in any way modifying or combining the references so as to provide the presently claimed subject matter for addressing the problems referred to above and in the specification, as discussed above.

Moreover, the Federal Circuit in the case of In re Kotzab has made plain that even if a claim concerns a "technologically simple concept" -- which is not believed to be the case here, there still must be some finding as to the "specific understanding or principle within the knowledge of a skilled artisan" that would motivate a person having no knowledge of the claimed subject matter to "make the combination in the manner claimed" to provide the advantages and/or benefits of the claimed subject matter, stating that:

> In this case, the Examiner and the Board fell into the hindsight trap. The idea of a single sensor controlling multiple valves, as opposed to multiple sensors controlling multiple valves, is a technologically simple concept. *With this simple concept in mind, the Patent and Trademark Office found prior art statements that in the abstract appeared to suggest the claimed limitation. But, there was no finding as to the specific understanding or principle within the knowledge of a skilled artisan that would have motivated one with no knowledge of Kotzab's invention to make the combination in the manner claimed.* In light of our holding of the absence of a motivation to combine the teachings in Evans, we conclude that the Board did not make out a proper *prima facie* case of obviousness in rejecting [the] claims . . . under 35 U.S.C. Section 103(a) over Evans.

(See In re Kotzab, 55 U.S.P.Q.2d 1313, 1318 (Federal Circuit 2000) (italics added)). It is respectfully submitted that there have been no such findings to establish that the features discussed above of the rejected claims are met by the references relied upon. As referred to above, it is believed that any review of the references, whether taken alone or combined, makes plain that they simply do not describe the features discussed above of the rejected claims.

The cases of In re Fine, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988), and In re Jones, 21 U.S.P.Q.2d 1941 (Fed. Cir. 1992), also make plain that the Office Action's generalized assertions that it would have been obvious to modify the reference(s) relied upon do not properly support a § 103 rejection. It is respectfully suggested that those cases make plain that the Office Action reflects a subjective "obvious to try" standard, and therefore does not reflect

the proper evidence to support an obviousness rejection based on the references relied upon. In particular, the Court in the case of In re Fine stated that:

> The PTO has the burden under section 103 to establish a *prima facie* case of obviousness. It can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references. This it has not done. . . .
>
> . . . .
>
> **Instead, the Examiner relies on hindsight in reaching his obviousness determination. . . . One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.**

(In re Fine, 5 U.S.P.Q.2d at 1598 to 1600 (citations omitted; italics in original; emphasis added)).

Likewise, the Court in the case of In re Jones stated that:

> Before the PTO may combine the disclosures of two or more prior art references in order to establish *prima facie* obviousness, there must be some suggestion for doing so, found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. . . .
>
> **Conspicuously missing from this record is any evidence, other than the PTO's speculation (if it be called evidence) that one of ordinary skill . . . would have been motivated to make the modifications . . . necessary to arrive at the claimed [invention].**

(In re Jones, 21 U.S.P.Q.2d at 1943 & 1944 (citations omitted; italics in original)).

It is respectfully submitted that this is the case here since it is believed and respectfully submitted that the Office Action offers conclusory hindsight, reconstruction and speculation, which these cases have indicated does not constitute evidence that will sustain an obviousness finding. Accordingly, it is respectfully submitted that the assertions in this regard do not provide proper evidence of a motivation or suggestion for combining or modifying a reference(s) to provide the claimed subject matter.

In short, the references relied upon, whether taken alone, combined or modified, would not provide the features of the claims discussed above. It is therefore respectfully submitted that the claims are allowable for these reasons.

As further regards all of the obviousness rejections of the claims, it is respectfully submitted that a *prima facie* case has not been made in the present case for obviousness, since the Office Action has not made any findings, such as, for example, regarding in any way what a person having ordinary skill in the art would have been at the time the claimed subject matter of the present application was made. (See *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1455 (Fed. Cir. 1998) (the "factual predicates underlying" a *prima facie* "obviousness determination include the scope and content of the prior art, the differences between the prior art and the claimed invention, and the level of ordinary skill in the art")). It is respectfully submitted that the proper test for showing obviousness is what the "combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art", and that the Patent Office must provide particular findings in this regard -- the evidence for which does not include "broad conclusory statements standing alone". (See *In re Kotzab*, 55 U.S.P.Q. 2d 1313, 1317 (Fed. Cir. 2000) (citing *In re Dembiczak*, 50 U.S.P.Q.2d 1614, 1618 (Fed. Cir. 1999) (obviousness rejections reversed where no findings were made "concerning the identification of the relevant art", the "level of ordinary skill in the art" or "the nature of the problem to be solved"))). It is respectfully submitted that there has been no such showing by the Office Action.

The law mandates that the allocation of the proof burdens requires that the Patent Office provide the factual basis for rejecting a patent application under 35 U.S.C. § 103. (See *In re Piasecki*, 745 F.2d 1468, 1472, 223 U.S.P.Q. 785, 788 (Fed. Cir. 1984) (citing *In re Warner*, 379 F.2d 1011, 1016, 154 U.S.P.Q. 173, 177 (C.C.P.A. 1967))). In short, the Office bears the initial burden of presenting a proper prima facie unpatentability case. (See *In re Oetiker*, 977 F.2d 1443, 1445, 24, U.S.P.Q.2d 1443, 1444 (Fed. Cir. 1992)).

It is respectfully submitted that the Amendments do not include new matter. In this regard, the Federal Circuit has made plain that a literalistic and therefore "in haec verba" view of the "new matter" doctrine is not consistent with the relevant law defining that doctrine. In the case of *Chemcast Corp. v. Arco Ind. Corp.*, 5 U.S.P.Q..2d 1225, 1237 (E.D. Mich. 1987), for example, the court made plain that:

> New matter is matter involving a departure from or in addition to the original disclosure, 37 CFR §1.118. . . . New matter is not introduced by amendments . . . which merely clarify or make definite that which was expressly or inherently disclosed in the parent application or which conform the specification to matter originally disclosed in the drawings or claims. . . . Added subject matter is not new matter when it is "something that might fairly be deduced from the original application."

(Quoting *Stearn v. Superior Distributing Co* ., 674 F.2d 539, 544, 215 U.S.P.Q. 1089, 1093 (6th Cir. 1982) (citations omitted)); and see *In re Hogan and Bands*, 194 U.S.P.Q. 527, 539 (C.C.P.A. 1977)) (new matter is not presented when a person having ordinary skill in the art

would reasonably conclude that a written description of the claimed subject matter is provided, even if such support does not literally correspond to the claims). Accordingly, in the present case, there is plain and unequivocal support in the present application for any amendments, so that they cannot and do not represent new matter.

As regards claims 22 and 26, these claims depend from claim 11 and are therefore allowable for the same reasons as claim 11.

Claims 1, 36, 38, 39 and 47 include features like those of claim 11 and are therefore allowable for essentially the same reasons as claim 11.

Claim 37 depends from claim 36 and is therefore allowable for the same reasons as claim 36.

As to paragraph 22 of the Office Action , claim 22 depends from claim 11 and is therefore allowable for the same reasons.

As to paragraph 23, claim 1 is allowable as explained above.

As to paragraphs 24 to 29, claims 2 to 10 depend from claim 1, and claims 12 to 20 and 26 depend from claim 11, so that the dependent claims are allowable for the same reasons as claims 1 and 11 from which they respectively depend.

As to paragraphs 30 and 31, claims 36 to 39, 47 and 52 include features like claims 1 and/or 11, and are therefore allowable for essentially the same reasons, as explained above.

As to paragraphs 32 to 38, claims 21, 23 to 25, 27 to 35 depend from claim 11, so that these dependent claims are allowable for the same reasons as claim 11.

As to paragraphs 39 and 40, claims 40 to 46 depend from claim 39, and claims 49 to 51 depend from claim 47, so that the dependent claims are allowable for the same reasons as claims 39 and 47 from which they respectively depend, as explained above. Claim 48 has been canceled without prejudice.

As explained above with respect to paragraph forty-one (41) of the Office Action, Applicants thank the Examiner for indicating that claim 53 contains allowable subject matter. Since, however, claim 53 depends from claim 52, which is believed to be allowable as now presented, any objection as to claim 53 is respectfully traversed. Regarding the submission of evidence that the performance of the mass spectroscopy system is enhanced solely by gas-to-gas contact, without coaxial heating, it is believed and respectfully submitted that this is evidenced by the fact that the arrangement of Figure 7 shows no enhancement -- even though heating of the capillary may occur, but not to the temperatures found useful by the system of the Danell reference. Accordingly, claim 53 is allowable.

New claims 55 to 59 do not include new matter and are supported in the specification. New claims 55 to 59 depend from claim 47 and are therefore allowable for the same reasons as claim 47.

In summary, it is respectfully submitted that all of claims 1 to 47 and 49 to 59 of the present application are allowable at least for the foregoing reasons.

CONCLUSION

In view of all of the above, it is believed that and the objections and rejections of claims 1 to 54 have been obviated, and that currently pending claims 1 to 47 and 49 to 59 are therefore allowable. It is therefore respectfully requested that the objections and rejections be reconsidered and withdrawn, and that the present application issue as early as possible.

If there are any questions and to facilitate matters, the Examiner is encouraged to contact Aaron C. Deditch at (212) 908-6417.

Respectfully Submitted,
KENYON & KENYON

Dated: 3/18/2003

By: _____
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AMENDMENT VERSION WITH MARKINGS

IN THE ABSTRACT:

Please amend without prejudice the Abstract as follows:

[The present invention relates to an] An apparatus and method for use with a mass spectrometer[. The], in which an ion enhancement system [of the present invention is used to] directs a heated gas [toward] to heat ions produced by a matrix based ion source and detected by a detector of the mass spectrometer. The ion enhancement system is interposed between the ion source and the detector of the mass spectrometer. The analyte ions that contact the heated gas are enhanced [and an] to increase[d] the number and/or intensity of ions [are more easily] detected by [a] the detector of the mass spectrometer. The method [of the invention comprises] includes producing analyte ions from a matrix based ion source, enhancing the analyte ions with an ion enhancement system and detecting the [enhanced] analyte ions with [a] the detector of the mass spectrometer.

IN THE SPECIFICATION:

Please amend without prejudice the Specification as follows:

Please amend the paragraph beginning at line 12 of page 10 as follows:

Figs. 2 and [4-7] 4-6 illustrate the first embodiment of the invention. The conduit 9 is designed to enclose the collecting capillary 5. The conduit 9 may enclose all of the collecting capillary 5 or a portion of it. However, it is important that the conduit 9 be adjacent to the collecting capillary end 20 so that heated gas can be delivered to the analyte ions located in the ionization region 15 before they enter or are collected by the collecting capillary 5. Figs. 1-6 and 8, show only a few embodiments of the present invention and are employed for illustrative purposes only. They should not be interpreted as narrowing the broad scope of the invention. The conduit 9 may be a separate component or may comprise a part of the coupling 23. Figs. 4-6 show the conduit 9 as a separate component.

Please replace/amend the paragraph beginning at line 22 of page 10 as follows:

Figs. 4-6 show coupling 23 and its design for joining the collecting capillary 5, the main capillary 18, and the conduit 9. The coupling 23 is designed for attaching to a fixed support 31 (shown in Figs. 7 and 8). The coupling 23 comprises a spacer 33, a housing 35, and a capillary cap 34 (see Fig. 5). The capillary cap 34 and the spacer 33 are designed to fit within the hosing 35. The spacer 33 is designed to apply pressure to the capillary cap 34 so that a tight sea is maintained between the capillary cap 34 and the main capillary 18. The

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capillary cap 34 is designed to receive the main capillary 18. A small gap 36 is defined between the spacer 33 and the capillary cap 34 (See Fig. 6). The small gap 36 allows gas to flow from the gas source 7 [into] through the conduit 9 adjacent the collecting capillary 5, as opposed to out of the housing 35 as [is accomplished with prior art devices] in the arrangement of Fig. 7.

Please replace/amend the paragraph beginning at line 15 of page 11 as follows:

Fig. 7 shows a cross-sectional view of [a prior art] an alternative device. The collecting capillary 5 is connected to the main capillary 18 by the capillary cap 34. The capillary cap is designed for receiving the main capillary 18 and is disposed in the housing 35. The housing 35 connects directly to the fixed support 31. Note that the gas source provides the gas through the channels 38 defined between the housing 35 and the capillary cap 34. The gas flows from the gas source 7 into the channel 38 through a passageway 24 and then into an ionization chamber 30. [The gas is released into the ionization chamber 30 and serves no purpose at this point.]

Please replace/amend the paragraph beginning at line 23 of page 11 as follows:

Fig. 8 shows a cross-sectional view of the first embodiment of the present invention, with the conduit 9 positioned between the ion source 3 and the gas source 7. The conduit 9 operates to carry the heated gas from the gas source 7 to the collecting capillary end 20. The method of the present invention produces enhanced analyte ions for ease of detection in the mass spectrometer 1. The method comprises heating analyte ions located in the ion or ionization region 15 adjacent to the collecting capillary 5 with a directed gas to make them more easily detectable by the detector 11. Gas is produced by the gas source 7, directed through the channels 38 and the small gap 36. From there the gas is carried into an annular space 42 defined between the conduit 9 and the collecting capillary 5. The heated gas then contacts the optional centering device 40 (not shown in Fig. 8). The centering device 40 is disposed between the collecting capillary 5 and the conduit 9 and shaped in a way to regulate the flow of gas to the ionization region 15. Gas flows out of the conduit 9 into the ionization region 15 adjacent to the collecting capillary end 20. The analyte ions in the ionization region 15 are heated by the gas that is directed into this region. Analyte ions that are then enhanced are collected by the collecting capillary 5, carried to the main capillary 18 and then sent to the detector 11. It should be noted that after heat has been added to the analyte ions adjacent to the source, the detection limits and signal quality improve dramatically. This specific result based on heating the analyte ions adjacent to the source is quite unexpected. For instance, since no solvent is used with AP-MALDI and MALDI ion sources and mass spectrometers,

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desolvation [and/or] or application of a gas to heat the ions would not be expected to be effective in enhancing the number or intensity of ions detected [ion detection] in matrix based ion sources and mass spectrometers. However, it is believed that [the invention operates by the fact that] large ion clusters are broken down to produce bare analyte ions that [are more easily detectable] improve detection limits and signal quality, as referred to above. [In addition, the application of heat also helps with sample evaporation.]

IN THE CLAIMS:

Without prejudice, please cancel claim 48 and please add new claims 55 to 59 as indicated above, and please amend the claims as follows:

1. (Amended) A conduit for providing a heated gas flow to enhance analyte ions produced by a matrix based ion source and discharged to an ion[ization] region adjacent to a collecting capillary.

11. (Amended) A mass spectrometer [that produces enhanced analyte ions for ease of detection,] comprising:

(a) a matrix based ion source for producing and discharging analyte ions to an ion[ization] region;

(b) a collecting capillary downstream from both said matrix based ion source and said ion[ization] region for receiving said analyte ions produced and discharged from said ion source to said ion[ization] region;

(c) a gas source for providing a gas;

(d) a conduit for conducting said gas from said gas source toward said ion[ization] region and providing ion enhancement to said analyte ions located in said ion[ization] region before said analyte ions enter said collecting capillary, and

(e) a detector downstream from said collecting capillary for detecting said analyte ions enhanced and received by said collecting capillary, wherein the detector includes or is coupled to a mass analyzer.

28. (Amended) The mass spectrometer of claim 11, wherein the volume of said ion[ization] region is from 1-5 mm^3.

36. (Amended) A method for [producing enhanced] detecting analyte ions [for ease of detection] in a mass spectrometer, comprising:

(a) heating analyte ions produced from a matrix based ion source with a directed gas to produce [said] enhanced analyte ions; and

(b) detecting said enhanced analyte ions with a detector, wherein the detector

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includes or is coupled to a mass analyzer.

38. (Amended) A method for [producing enhanced] heating analyte ions for [ease of] detection in a mass spectrometer, comprising:

directing a heated gas flow through a conduit to an ion[ization] region adjacent to a collecting capillary to heat said analyte ions located in the ion[ization] region and [make] increase at least one of an intensity and a number of said analyte ions [more easily detectable] detected by a detector, wherein the detector includes or is coupled to a mass analyzer.

39. (Amended) An apparatus that produces enhanced analyte ions for [ease of] detection by an ion detector, comprising:

(a) a matrix based ion source for producing analyte ions;

(b) an ion detector downstream from said ion source for detecting enhanced analyte ions;

(c) an ion enhancement system interposed between said matrix based ion source and said ion detector for enhancing said analyte ions; and

(d) an ion transport system adjacent to said ion enhancement system for transporting said enhanced analyte ions from said ion enhancement system to said ion detector [for ease of detection].

40. (Amended) An apparatus as recited in claim 39, wherein said ion detector [is] includes a mass analyzer.

47. (Amended) A mass spectrometer [that produces enhanced analyte ions for ease of detection,] comprising:

(a) a matrix based ion source for producing analyte ions;

(b) an ion detector downstream from said ion source for detecting enhanced analyte ions, the ion detector including or being coupled to a mass analyzer;

(c) an ion enhancement system spaced from and interposed between said matrix based ion source and said ion detector for enhancing said analyte ions; and

(d) an ion transport system adjacent to said ion enhancement system for transporting [said] enhanced analyte ions from said ion enhancement system to said ion detector [for ease of detection].

52. (Amended) A method for [producing enhanced] detecting analyte ions [for ease of detection] by a mass spectrometer, comprising:

(a) producing analyte ions in a matrix based ion source and discharging said ions

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to an ion[ization] region;

(b) enhancing said analyte ions discharged to said ion[ization] region with an ion enhancement system; and

(c) detecting said enhanced analyte ions with a detector, wherein the detector includes or is coupled to a mass analyzer.